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X-ray pulse generation via laser Compton scattering using quasi-monoenergetic electron beam driven by laser acceleration EISUKE MIURA, RYUNOSUKE KURODA, HIROYUKI TOYOKAWA, National Institute of Advanced Industrial Science and Technology — We have demonstrated X-ray generation via laser Compton scattering using a laser-accelerated quasi-monoenergetic electron beam. X-rays were generated by scattering a femtosecond laser pulse (800 nm, 140 mJ, 100 fs) off a quasi-monoenergetic electron beam containing 70 pC electrons in the monoenergetic peak with an energy of 60 MeV produced by focusing an intense laser pulse (800 nm, 700 mJ, 40 fs) on a helium gas jet. A well-collimated X-ray beam with a divergence angle of approximately 5 mrad was generated. The number of X-ray photons was estimated to be 2×10^7 per pulse. The characteristics of X-rays were also investigated using simulation. The spectrum of X-rays emitted within the scattered angle of 5 mrad had a quasi-monochromatic structure with a peak at 60 keV. The number of X-ray photons was 1.8×10^7, which was in a good agreement with the experimental result. The allowance delay range between the two laser pulses for X-ray generation was approximately 100 fs, and was nearly equal to the duration of the laser pulse scattered by the electron pulse. This suggests that the X-ray pulse duration was shorter than 100 fs.

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